

DEPARTMENT OF ENERGY  
FY 1999 CONGRESSIONAL BUDGET REQUEST  
OTHER DEFENSE ACTIVITIES  
(Tabular dollars in thousands, Narrative in whole dollars)

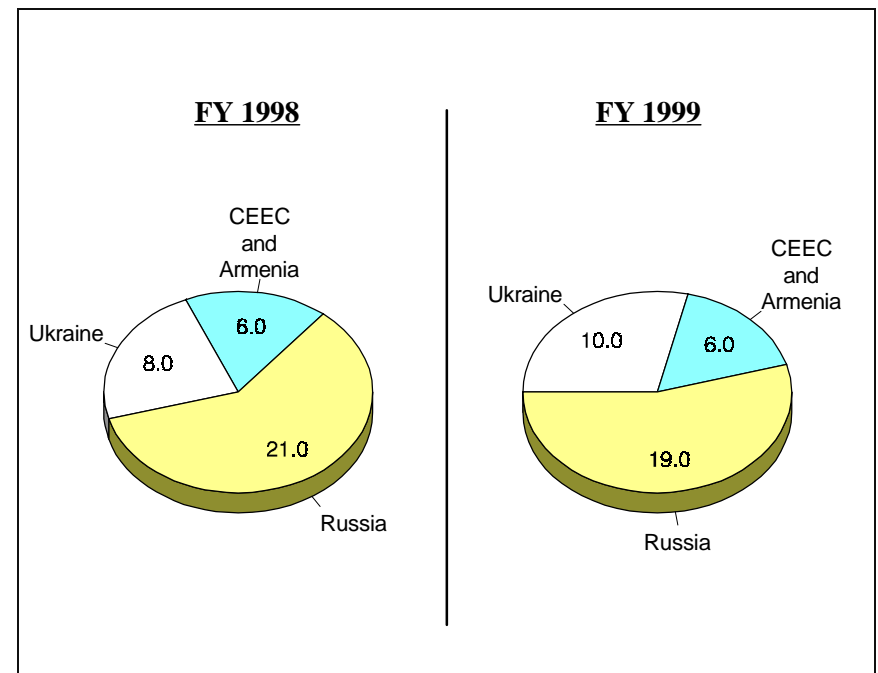
INTERNATIONAL NUCLEAR SAFETY

PROGRAM MISSION

The 1986 disaster at the Chornobyl nuclear power plant revealed, during a short, intense period, the many flaws in the Soviet approach to nuclear power and was one factor that led to the fall of the Soviet Union. The Soviet public, outraged by the apparent lack of concern for human health and environmental safety, the deception practiced by high-ranking officials, and the inability of the Soviet government to cope effectively with the aftermath, demanded change. A few short years later, the Soviet Union collapsed.

The reactors and nuclear infrastructures left behind by the Soviet government continue to operate in seven countries. Many of these reactors, including one that still operates at the Chornobyl site, suffer from deficiencies in training, safety procedures, and oversight--the same kinds of problems that allowed the Chornobyl accident to occur almost eleven years ago. Some problems have been exacerbated by the breakup of the Soviet Union--equipment shortages are commonplace and many nuclear professionals suffer from low or erratic pay. These conditions, if not corrected, could result in a new major nuclear accident in Ukraine, Russia, Armenia, Kazakhstan or in Central and Eastern Europe.

If another major nuclear accident occurred at one of the Soviet-designed reactors, the United States and the international community could be forced to deal with: a potentially massive humanitarian crisis requiring huge expenditures; the radioactive contamination of vital European allies (including those where U.S. military personnel are stationed) and friendly countries; the political and economic destabilization of a politically sensitive region of the world; and discrediting and weakening of



*Funding by Country*

democracy movements in the region in the same manner that the Chernobyl accident weakened the Soviet system. These potential consequences led the Administration to conclude that enhancing the safety of Soviet-era nuclear reactors and establishing improved safety infrastructures in the countries that operate them is a vital national security interest of the United States. The U. S. and other Western countries have the technologies and skills to work with these nations to address nuclear safety challenges with a modest investment. Rather than providing billions of dollars in foreign aid, these countries are being directed to an independent path toward adequate nuclear safety. This is essential to preserve these emerging, democratic, free market economies.

The International Nuclear Safety program is designed to reduce the national security and environmental threats posed by the operation of unsafe and aging nuclear facilities around the world. Particular attention is paid to improving the safety of Soviet-designed nuclear power plants. This program originated from U.S. commitments made at the 1992 G-7 Summit to help reduce the risks associated with the continued operation of Soviet-designed reactors and is conducted consistent with guidance and policies established by the U.S. Department of State, the Agency for International Development, and the Nuclear Regulatory Commission. This program will also support membership representation in organizations such as the Nuclear Energy Agency (NEA) of the Organization of Economic Cooperation and Development (OECD).

While serving a direct, national security need, the Department's International Nuclear Safety Program provides several other benefits to the United States: (1) the success of this program helps encourage Russia and other countries to continue cooperating in the control and accounting of nuclear weapons materials; (2) the program provides an entre for U.S. industry into the economies of the former Soviet Union, which could lead to significant business opportunities in the future; and (3) the program addresses nuclear safety issues which, if not dealt with, could further erode public confidence in nuclear energy in the United States and other countries.

The GOALS of the International Nuclear Safety program are to:

1. Prevent another Chernobyl-type catastrophic accident.
2. Improve nuclear safety worldwide, particularly the safety of Soviet-designed nuclear power plants, without extending the operating lives of these plants.
3. Develop and maintain core competencies in the area of nuclear safety.
4. Support collaborative nuclear safety projects with the International Chernobyl Center for Nuclear Safety, Radioactive Waste and Radioecology (Chernobyl Center) in the city of Slavutych, forty miles northeast of Chernobyl Nuclear Power Plant, and the Russian International Nuclear Safety Center in Moscow.

The OBJECTIVES related to these goals are:

To enhance the safety of Soviet-designed nuclear power plants and help host countries upgrade their nuclear safety cultures and supporting infrastructures through:

- (1) installation of equipment and development of methods that will improve the safety of operations;
- (2) transfer technologies needed to reduce risks of reactor operations;
- (3) incorporate the owners and operators of Soviet-designed nuclear power plants as full partners in the global nuclear industry;
- (4) cultivate a more robust attitude towards nuclear safety;
- (5) enhance indigenous capabilities to evaluate safety and make decisions about shutdown;
- (6) create opportunities for U.S. industries in the host countries; and
- (7) support collaborative nuclear safety projects and data exchanges through the International Nuclear Safety Centers.

#### PERFORMANCE MEASURES:

##### Management and Operational Safety Improvements

- Complete an alternate decay heat removal system and install steam line isolation valves at the Armenia nuclear power plant to ensure safety plant shutdown in case of an earthquake
- Complete full-scope simulators for the South Ukraine and Zaporizhzhya plants in Ukraine
- Complete a fire hazards safe reactor shutdown study at the Smolensk plant in Russia

##### Engineering and Technology Upgrades

- Complete an analytical simulator and an upgrade to a full-scope simulator at the Balakovo plant in Russia
- Complete full-scope simulators at the Kola and Kalinin plants in Russia
- Complete an upgrade of the full-scope simulator at the Trnava training center in Slovakia
- Complete technology transfer projects for emergency power supply batteries, circuit breakers and emergency valves in Russia and safety control modules in Lithuania
- Complete four Safety Parameter Display Systems at plants in Russia and Ukraine to improve operator response to emergencies
- Complete an upgrade to the full-scope simulator at the Kozloduy plant in Bulgaria

## PERFORMANCE MEASURES: (continued)

### Plant Safety Evaluations

- Complete in-depth safety assessments at the Leningrad and Kola plants in Russia
- Complete a fire hazards safe reactor shutdown study at the Smolensk plant in Russia

### Nuclear Safety Institutional and Regulatory Support

- Ensure that training, workshops, and technology transfer on international regulatory procedures, nuclear indemnification laws, nuclear safety convention practices and standards, and regulation of large research reactors and fuel cycle facilities are 50% complete in host countries.

### International Safety Centers

- Assist Russians in adding plant specific data for four Russian nuclear power plants to the Russian International Nuclear Safety Center database.
- Maintain and update the U.S. nuclear safety database to allow for prompt analysis of potential safety problems.

## SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- More than 200 individual projects have been initiated with the participation of 20 Soviet-designed plant sites and include the participation of 46 U.S. commercial companies to provide equipment, technical expertise, and services to improve safety.
- More than 200 staff members from 14 nuclear reactor sites in Russia, Ukraine, and Central and Eastern European countries have worked with personnel at 12 U.S. nuclear power plants to observe, firsthand, practices and procedures for safe operation of U.S. reactors.
- The simulator models for Ukraine's Khmelnytsky plant have been developed.
- Two plant analyzers for Bulgaria's Kozloduy plant have been provided. A plant analyzer has been provided to the Lithuania for the Ignalina plant.

## SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS: (continued)

- Nuclear training centers have been established at the Balakovo site in Russia and the Khmelnytsky plant in Ukraine. Training specialists from these centers are now training other Russian and Ukrainian nuclear plant personnel using a U.S. provided method that focuses on the knowledge and abilities required to perform essential tasks.
- The methodology for developing symptom-based Emergency Operating Instructions has been transferred to plant experts in Russia, Ukraine, Bulgaria and Lithuania. Further development has transferred to the World Association of Nuclear Operators.
- The confinement of the Kola plant has been significantly improved through the installation of sealant materials, fast-closing isolation valves, and radiation monitors. Additionally, emergency power at the Kola plant has been improved by the installation of five reliable DC batteries and switchgear.
- A developmental RBMK Safety Parameter Display System (SPDS) has been provided to Russia to complete the design of the first unit being installed at Kursk. In FY 1998 complete implementation of SPDS's at Russia's Novovoronezh plant and the Zaporizhzhya and Khmelnytsky plants in Ukraine.
- Fire safety equipment has been provided to the Zaporizhzhya and Chornobyl plants in Ukraine and the Smolensk and Leningrad plants in Russia.
- A spent fuel dry storage system transporter and cask liners have been provided to the Zaporizhzhya plant in Ukraine. Ukrainian nuclear regulators have also been trained in spent fuel dry storage technology to support licensing.
- In FY 1999 complete in-depth safety assessments at the Leningrad and Kola plants in Russia.

INTERNATIONAL NUCLEAR SAFETY  
PROGRAM FUNDING PROFILE

	FY 1997 Current <u>Appropriation</u>	FY 1998 Original <u>Appropriation</u>	FY 1998 <u>Adjustments</u>	FY 1998 Current <u>Appropriation</u>	FY 1999 <u>Request</u>
<u>Sub-program</u>					
International Nuclear Safety Activities	\$81,000 <sup>1</sup>	\$ 35,000	\$0	\$35,000	\$35,000
<b>TOTAL, International Nuclear Safety</b>	<b><u>\$81,000</u></b>	<b><u>\$35,000</u></b>	<b><u>\$0</u></b>	<b><u>\$35,000</u></b>	<b><u>\$35,000</u></b>

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<sup>1</sup> Includes funding provided by U.S. AID for Ukraine (\$30,000,000) and Armenia (\$6,000,000).

INTERNATIONAL NUCLEAR SAFETY  
PROGRAM FUNDING BY SITE

<u>Laboratory/Plant/Installation</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Original <u>Appropriation</u>	FY 1998 <u>Adjustments</u>	FY 1998 Current <u>Appropriation</u>	FY 1999 Budget <u>Request</u>
Richland Operations Office					
Pacific Northwest National Laboratory <sup>1</sup>	\$79,837	\$34,000	\$0	\$34,000	\$34,000
Nevada Operations Office	\$50	\$0	0	\$0	\$0
Oak Ridge Operations Office	\$13	\$0	0	\$0	\$0
Washington Headquarters	<u>\$1,100</u>	<u>\$1,000</u>	<u>0</u>	<u>\$1,000</u>	<u>\$1,000</u>
<b>TOTAL, International Nuclear Safety</b>	<b><u>\$81,000</u><sup>2</sup></b>	<b><u>\$ 35,000</u></b>	<b><u>\$0</u></b>	<b><u>\$ 35,000</u></b>	<b><u>\$35,000</u></b>

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<sup>1</sup> PNNL in the main implementing laboratory, most of the funds go to foreign power plants or institutions and to U.S. commercial contractors to assist in technology transfer.

<sup>2</sup> Includes funding provided by U.S. AID for Ukraine (\$30,000,000) and Armenia (\$6,000,000).

INTERNATIONAL NUCLEAR SAFETY  
(Dollars in Thousands)

**I. Mission Supporting Goals and Objectives:**

This activity has four elements that are critical to achieving lasting improvements in nuclear safety culture and infrastructure development. First, the program is working to improve the capabilities of nuclear power plant operators to establish sound operational procedures, and to develop methods for responding to operational abnormalities. Second, the program seeks to improve the physical condition of the plants, particularly their safety systems. Third, the program provides professionals involved in the design, operation, and regulation of nuclear power plants with the techniques and expertise required to conduct safety analyses that are consistent with U.S. practices. The fourth element is assistance to host countries in developing the domestic liability legislation needed to enable a broader involvement of U.S. private industry and to establish a strong, independent regulatory authority.

**II. Funding Schedule:**

<b><u>Program Activity</u></b>	<b><u>FY 1997</u></b>	<b><u>FY 1998</u></b>	<b><u>FY 1999</u></b>	<b><u>\$ Change</u></b>	<b><u>% Change</u></b>
Management & Operational Safety Improvements	\$30,200	\$9,900	\$11,800	\$ +1,900	+19
Engineering & Technology Upgrades	24,800	10,000	9,000	-1,000	-10
Plant Safety Evaluations	11,800	6,400	5,500	-900	-14
Nuclear Safety Institutional & Regulatory Support	1,500	1,500	1,500	0	0
Program Management	7,200	5,000	5,000	0	0
International Nuclear Safety Centers	5,500	1,500	1,500	0	0
International Nuclear Safety Activities Support	0	700	700	0	0
<b>TOTAL, International Nuclear Safety</b>	<b><u>\$81,000<sup>1</sup></u></b>	<b><u>\$35,000</u></b>	<b><u>\$35,000</u></b>	<b><u>\$0</u></b>	<b><u>0</u></b>

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<sup>1</sup> Includes funding provided by U.S. AID for Ukraine (\$30,000,000) and Armenia (\$6,000,000).



**III. Performance Summary - Major Accomplishments:**

	<b><u>FY 1997</u></b>	<b><u>FY 1998</u></b>	<b><u>FY 1999</u></b>
<b><u>Management and Operational Safety Improvements</u></b>			
• Improve management and operational safety practices and procedures. Complete the drafting of Emergency Operating Instructions (EOIs) for all Soviet-designed reactor types and transfer further development to the World Association of Nuclear Operators (WANO). Support required safety analysis for EOI implementation.	\$600	\$900	\$0
• Transfer the pilot training courses and training methodology from the training centers to other Soviet-design nuclear plant sites. Improve operator training in Armenia.	\$3,000	\$1,000	\$1,250
• Install Ukraine's Khmelnytsky plant simulator. Complete full-scope simulators at the Kola, Balakovo, and Kalinin plants in Russia. Complete simulators for the South Ukraine, Chornobyl, Zaporizhzhya and Rivne plant in Ukraine. Improve simulator training programs and upgrade simulators for the use of Safety Parameter Display Systems.	\$18,300	\$2,000	\$4,500
• Complete analytical simulators at the Bilibino and Novovoronezh plants in Russia. Upgrade the Balakovo full scope simulator in Russia. Upgrade the Trvana training center simulator in Slovakia.	\$4,500	\$1,000	\$500
• Complete the implementation of a configuration management system in Lithuania and begin implementation in Russia and Ukraine.	\$500	\$1,200	\$1,200
• Implement quality assurance program in Ukraine and Non-destructive examination program in Russia and Ukraine.	\$1,500	\$1,500	\$1,500
• Transfer safety related maintenance technology to plants in Ukraine, and Lithuania.		\$800	\$600
• Continue the implementation of a reliability database system in Russia and Ukraine.	\$1,000	\$1,000	\$1,250
• Continue the improvement of event analysis and lessons learned at all Soviet-designed plants, including root cause analysis.	\$500	\$500	\$1,000
• Complete a decommissioning study of the Lenigrad plant in Russia.	<u>\$300</u>	<u>\$0</u>	<u>\$0</u>
Total Management and Operational Safety Improvements	\$30,200	\$9,900	\$11,800

III. <u>Performance Summary - Major Accomplishments: (continued)</u>	<u>FY 1997</u>	<u>FY 1998</u>	<u>FY 1999</u>
<u>Engineering and Technology Upgrades</u>			
<ul style="list-style-type: none"> <li>Complete safety system upgrades such as the implementation of Safety Parameter Display Systems at the Kursk, Leningrad, and Novovoronezh plants in Russia, and the Chornobyl plant in Ukraine. Transfer safety related equipment upgrade technology. Complete a seismic resistant decay heat removal system in Armenia. Complete the implementation of circuit breaker and electronic module upgrades in Russia, Ukraine, and Lithunania.</li> </ul>	\$9,800	\$9,000	\$6,500
<ul style="list-style-type: none"> <li>Provide Safety Parameter Display Systems for VVER-1000 plants in Ukraine.</li> </ul>	\$14,500	\$0	\$0
<ul style="list-style-type: none"> <li>Basic fire safety equipment was provided to the Zaporizhzhya and Chornobyl plants in Ukraine, the Smolensk and Leningrad plants in Russia, and the Armenia nuclear power plant. Guidelines for conducting detailed fire hazards analysis at Soviet-designed plants based on U.S. experience were developed. Complete detailed fire hazards evaluations in Russia using the U.S. developed guidelines. Initiate safe shutdown upgrades identified in fire hazard evaluations.</li> </ul>	<u>\$500</u>	<u>\$1,000</u>	<u>\$2,500</u>
Total Engineering and Technology Upgrades	\$24,800	\$10,000	\$9,000
<u>Plant Safety Evaluations</u>			
<ul style="list-style-type: none"> <li>Complete in-depth safety assessments at the Leningrad, Kola, and Novovoronezh plants, and analysis of Kursk plants in Russia.</li> </ul>	\$3,500	\$3,400	\$3,500
<ul style="list-style-type: none"> <li>Complete in-depth safety assessments at the South Ukraine, Khmelnytsky and Zaporizhzhya plants in Ukraine.</li> </ul>	\$5,300	\$0	\$0
<ul style="list-style-type: none"> <li>Enhance code and data base development in support of safety assessments.</li> </ul>	<u>\$3,000</u>	<u>\$3,000</u>	<u>\$2,000</u>
Total Plant Safety Evaluations	\$11,800	\$6,400	\$5,500

<b>III. <u>Performance Summary - Major Accomplishments:</u> (continued)</b>	<b><u>FY 1997</u></b>	<b><u>FY 1998</u></b>	<b><u>FY 1999</u></b>
<u>Nuclear Safety Institutional and Regulatory Support</u>			
• Continue to assist host countries in the development of independent nuclear regulators.	\$1,500	\$1,500	\$1,500
<u>Program Management</u>			
• Continue to provide management support for International Nuclear Safety program.	\$7,200	\$5,000	\$5,000
<u>International Nuclear Safety Centers</u>			
• Support international nuclear safety data exchanges including maintenance of the U.S. nuclear safety database.	\$3,500	\$600	\$600
• Support safety projects at the International Nuclear Safety Center in Russia.	\$500	\$400	\$400
• Support of collaborative nuclear safety projects at the International Chernobyl Center for Nuclear Safety, Radioactive Waste and Radioecology.	<u>\$1,500</u>	<u>\$500</u>	<u>\$500</u>
Total International Nuclear Safety Centers	\$5,500	\$1,500	\$1,500
<u>International Nuclear Safety Activities Support</u>			
• Support Department of Energy representative in Paris at the U.S. Mission to the Organization for Economic Cooperation and Development (OECD) and the U.S. Embassy in Tokyo to maintain constructive engagement in promoting nuclear safety and curbing nuclear proliferation.	\$0	\$700	\$700
<b>Total, International Nuclear Safety</b>	<b><u>\$81,000</u></b>	<b><u>\$35,000</u></b>	<b><u>\$35,000</u></b>

**EXPLANATION OF FUNDING CHANGES FY 1998 TO FY 1999:**

•	The increase in funds for management and operational safety improvements is due to increased requirements for the training, quality assurance, and nondestructive examination programs in pilot plants in Russia, Ukraine, and Lithuania.	\$+1,900
•	The decrease in funds for engineering and technology upgrades is primarily due to completion of activities for installing SPDS at three plants in Russia.	\$-1,000
•	The decrease in funds for safety analysis is because U.S. AID is providing the funds to complete this work in Ukraine.	<u>\$-900</u>
<b>Total Funding Change, International Nuclear Safety</b>		<b>\$0</b>

DEPARTMENT OF ENERGY  
FY 1999 CONGRESSIONAL BUDGET REQUEST  
(Tabular dollars in thousands, Narrative in whole dollars)

NUCLEAR SECURITY

PROGRAM MISSION

The mission of the Nuclear Security program is to reduce the proliferation threats posed by plutonium and highly enriched uranium materials available in Russia, other states of the Former Soviet Union (FSU) and other countries of concern. Additional program elements address expansion of cooperation on national security-related nuclear issues and the safety and nonproliferation concerns related to breeder reactors in the FSU and alternatives to reprocessing of spent fuel.

The GOAL(S) of the Nuclear Security program are to:

1. Support conversion of the Russian plutonium production reactors to a mode that no longer produces weapons-grade plutonium.

The OBJECTIVES related to these goals are:

1. Produce detailed design work to convert the Russian plutonium production reactors to a mode that no longer produces weapons-grade plutonium.

PERFORMANCE MEASURES:

Performance measures for the Nuclear Security program include:

1. Produce design work necessary to achieve regulatory approval by mid 1998.

#### SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- Design work completed sufficient to support regulatory review and approval by mid 1998.

# NUCLEAR SECURITY

## PROGRAM FUNDING PROFILE

	FY 1997 Current <u>Appropriation</u>	FY 1998 Original <u>Appropriation</u>	FY 1998 <u>Adjustments</u>	FY 1998 Current <u>Appropriation</u>	FY 1999 Budget <u>Request</u>
<u>Sub-program</u>					
Nuclear Security	<u>\$3,500</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>	<u>\$0</u>
<b>TOTAL, Nuclear Security</b>	<b><u>\$3,500</u></b>	<b><u>\$0</u></b>	<b><u>\$0</u></b>	<b><u>\$0</u></b>	<b><u>\$0</u></b>

# NUCLEAR SECURITY

## PROGRAM FUNDING BY SITE

<u>Laboratory/Plant/Installation</u>	FY 1997 Current <u>Appropriation</u>	FY 1998 Original <u>Appropriation</u>	FY 1998 <u>Adjustments</u>	FY 1998 Current <u>Appropriation</u>	FY 1999 <u>Request</u>
Richland Operations Office					
Pacific Northwest National Laboratory	\$3,371	\$0	\$0	\$0	\$0
Lawrence Livermore National Laboratory	85	0	0	0	0
Washington Headquarters	<u>44</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<b>TOTAL, Nuclear Security</b>	<b><u>\$3,500</u></b>	<b><u>\$0</u></b>	<b><u>\$0</u></b>	<b><u>\$0</u></b>	<b><u>\$0</u></b>



NUCLEAR SECURITY  
(Dollars in Thousands)

**I. Mission Supporting Goals and Objectives:**

The United States is leading an effort to ensure that the Russian plutonium production reactors are converted to a mode that no longer produces weapons-grade plutonium. New reactor cores will be designed, manufactured, and installed which will not produce weapons-grade plutonium when operated.

**II. Funding Schedule:**

<b><u>Program Activity</u></b>	<b><u>FY 1997</u></b>	<b><u>FY 1998</u></b>	<b><u>FY 1999</u></b>	<b><u>\$ Change</u></b>	<b><u>% Change</u></b>
Russian plutonium production reactor core conversion	<u>\$3,500</u>	<u>\$0</u>	<u>\$0</u>	<u>0</u>	<u>0</u>
<b>TOTAL, Nuclear Security</b>	<b><u>\$ 3,500</u></b>	<b><u>\$0</u></b>	<b><u>\$0</u></b>	<b><u>\$0</u></b>	<b><u>0</u></b>

**III. Performance Summary - Major Accomplishments:****FY 1997****FY 1998****FY 1999****Safety improvements necessary for the operation of converted Russian Reactors**

- Initiate detailed design work to convert the Russian plutonium production reactors to a mode which no longer produces weapons-grade plutonium. (Subsequent funding for this activity is being provided under the Department of Defense's Cooperative Threat Reduction Program.)

\$3,500

\$0

\$0

**Total Nuclear Security****\$3,500****\$0****\$0****EXPLANATION OF FUNDING CHANGES FY 1998 TO FY 1999:**

- Not applicable